Assignment - 4

1. Generate 1000 real number for the variable X from the uniform distribution U [0,1]. Construct the training set $T = \{ (x_1,y_1),(x_2,y_2),\ldots\ldots,(x_{100},y_{100})\}$ using the relation

   $Yi = \sin(2 \pi x_i) + \epsilon_i$ where $\epsilon_i \sim N(0,0.25)$.

In the similar way construct a testing set of size 50

I,e. Test = $\{ (x'_1,y'_1),(x'_2,y'_2),\ldots\ldots,(x'_{50},y'_{50})\}$.

(a) Estimate the L_1- norm kernel regression model using the sub gradient descent method and RBF (Gaussian Kernel). Find the best RMSE and MAE by tuning the value of RBF kernel parameter σ and regularization parameter λ. Also obtain the corresponding plot of best estimate.

(b) Also, estimate the ε- Support Vector Regression model using the sub gradient descent method and RBF (Gaussian Kernel). Find the best RMSE and MAE by tuning the value of RBF kernel parameter σ, regularization parameter λ and ε . . Find the sparsity of the obtained solution vector α.

2. Consider the motorcycle dataset. Estimate the L_1- norm kernel regression model using RBF kernel (Gaussian Kernel) . Find the best RMSE and MAE using leave-one out by tuning the value of kernel parameter σ and regularization parameter λ. Also obtain the corresponding plot of best estimate.

3. Consider the motorcycle dataset. Estimate the ε- Support Vector Regression model using RBF kernel (Gaussian Kernel). Find the best RMSE and MAE using leave-one out by tuning the value of kernel parameter σ, regularization parameter λ and user defined parameter ε. Also obtain the corresponding plot of best estimate. Find the sparsity of the obtained solution vector α.